

Storage as the weak link of the biomass supply chain

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Abstract

Biomass such as wood, straw or agricultural wastes is a worldwide abundant resource offering high potential for a decantralized energy production and supply which is especially interesting for rural areas. However, substance and energy loss caused by microbial degradation is one major reason for high feedstock costs. As a consequence of the microbial activity and further exothermic processes, heat is produced inside stored piles, leading to temperatures >200 °C, causing partial pyrolysis and self-ignition. This work investigates the degradation process of spruce forest residues in order to generate a better knowledge about underlying processes and possible counteractions.

Therefore, the microbial metabolic activity has been described in dependency on the temperature, moisture content (MC), pH as well as the woodchip quality by respirometric tests. Additionally, temperature and gas measurements have been conducted in woodchip piles of commercial size.

Respirometric tests revealed the microbial activity over time showing a maximum within the first few days of storage. This corresponds to the measurements at woodchip stocks. This initial activity is responsible for the very high temperatures inside the woodchip piles reaching up to 80 °C within the first week. The moisture content is a key factor during wood degradation. No microbial activity could be verified for a MC<20 %. A moisture content of 46 % led to a monthly dry matter loss of 5.4 %. Also the pH plays an important role. Raising the pH from 7.5 to 9.0 by adding calcium carbonate reduced the monthly dry matter loss from 3.3 % to 1.8 % per month. Further investigations have to be conducted to clarify underlying mechanism and countermeasures. This issue does not only apply for woodchips but also for other biomass products that need to be stored over a period of time.

Keywords: Biomass, Dry matter loss, Self-ignition, Storage; Woodchips

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